

REMARKS

The specification has been amended to insert section headings.

Claims 32 – 34 have been added. Support for these claims can be found on at least page 4, line 23 through page 5, line 9, as well is on page 6, lines 25 – 30. Claims 12 – 14 have been canceled. Claims 1 – 11, 15 – 21, and 23 – 31 have been amended.

Claims 1 – 11 and 15 – 34 are pending in the subject application.

In the Office Action mailed 28 June 2005, the Examiner rejected claims 1 – 20 under 35 USC §112, and rejected claims 1 – 31 under 35 U.S.C. §103(a). Favorable reconsideration of the application and allowance of all of the pending claims are respectfully requested in view of the above amendments and the following remarks.

Claims 1 – 20 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants have amended the claims to address the issues raised by the Examiner. Accordingly, the Examiner is respectfully requested to reconsider and withdraw this rejection.

Claims 1 – 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,736,744 (Johannsen et al.) in view of applicants' statement of the prior art. The Examiner takes the position that the Johannsen et al. patent discloses all the features recited within these claims, except for the specified phosphors. This rejection is respectfully traversed since the Johannsen et al. patent does not disclose, teach, or suggest the features recited in independent claims 1, 16, 21, and 32 of a wavelength conversion screen comprising a scintillator that absorbs light of ultraviolet wavelengths and emits light of a narrow bandwidth λ_{s1} to λ_{s2} , which, in turn, causes a fluorophore having an excitation wavelength λ_{dx} to emit an emission wavelength λ_{dm} that is detected by a detector sensitive to λ_{dm} .

Johannsen et al. describes a wavelength shifting screen for use with transilluminators. The screens are fed to allow selective achievement of different incident wavelengths through samples positioned over the screen. While disclosing the use of phosphor scintillators generically (see col. 2, line 65), Johannsen et al. does not disclose the use of scintillators having a bandwidth of λ_{s1} to λ_{s2} , wherein the bandwidth is capable of exciting a fluorophore such that it emits an emission wavelength λ_{dm} . That is, Johannsen et al. provides no guidance as to what

particular phosphors can be used, or the properties (wavelengths, etc.) capable of exciting a fluorophore such that its emission wavelength may be detected. Commercially available phosphors possess an enormous range of properties. For example, some phosphors provide wide bandwidth emission spectra, while others provide line emissions. In addition, not all phosphors are capable of efficiently exciting fluorophores contained in fluorescent dyes. Johannsen et al. neither discusses what types of phosphors may be used to provide useful output wavelengths, nor discloses the properties of the fluorescent dyes (fluorophores) with which the phosphors may be used.

As explained in the specification on page 5, line 26 through page 6, line 30, the selection of a suitable scintillator for combination with a specific fluorophore requires a comparison of the emission spectrum of the scintillator with the excitation spectrum of the fluorophore. The fluorophore must absorb light of sufficient intensity in the excitation spectrum for the fluorophore to allow adequate levels of fluorescence to be achieved, while providing minimum overlap between the emission spectrum of the scintillator and the emission spectrum of the fluorophore. For example, Figure 3 compares a conventional phosphor scintillator with those of the present invention (having the claimed narrow bandwidth and fluorophore excitation properties). Specifically, curve B is a scintillator according to the present invention having a narrow bandwidth emission of λ_{s1} to λ_{s2} , wherein λ_{s1} and λ_{s2} are upper and lower wavelengths at the half maximum intensity (FWHM). Curve C, in contrast, is a typical emission spectrum of a known blue phosphor coating such as BAM blue. As explained in the specification on page 4, line 23 through page 5, line 9, the excitation wavelength of the fluorophore in a dye should fall within the band at which the intensity of light emitted by the fluorophore is substantial. This intensity is a combination of the quantum efficiency of the scintillator and the position of the emitted scintillation within the absorption envelope of the fluorophore. The intensity of the emissions *outside* the FWHM envelope is generally *too low for efficient excitation of the dye*. As can be seen in Figure 3, the excitation wavelength of conventional BAM blue falls outside the FWHM envelope; consequently, it would not efficiently excite the fluorophore in the dye.

Consequently, a screen including the claimed scintillators permits the selective excitation of fluorophores in a sample using incident light from an ultraviolet light source. That is, scintillators having a narrow bandwidth of λ_{s1} to λ_{s2} (wherein the excitation wavelength of a fluorophore falls within the narrow bandwidth) allows the selective illumination of more than one fluorescent dye in a given sample. The claimed scintillators and fluorophore combinations possess high absorption of light at ultraviolet wavelengths and high quantum efficiency light output, as well as have no satellite emission peaks (which would cause background noise), providing high contrast between the fluorescent dye in the sample and the background. This allows a detection system to be devised which either requires no filter or significantly simplifies the selection of a filter.

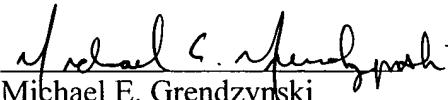
Since there is no guidance in Johannsen et al. as to what type of phosphors may be used to provide useful output wavelengths, or with which fluorescent dyes (fluorophores) its phosphors may be used and there is no apparent reason to combine the teachings of Johannsen et al. with the teachings of the instant disclosure other than through prohibited hindsight.

In view of the foregoing, Applicants respectfully request the Examiner to find the application to be in condition for allowance with claims 1 – 34. However, if for any reason the Examiner feels that the application is not now in condition for allowance, he is respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

RESPONSE TO 28 JUNE 2005 OFFICE ACTION
U.S. PATENT APPLICATION NO. 10/748,368

Filed concurrently herewith is an excess claim fee in the amount of \$200 for payment of 1 independent claim in excess of the 3 independent claims previously paid for. Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such extension is to be charged to Deposit Account No. 05-0460.

Respectfully submitted,


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